REMARKS

Claims 1-3

In the Office Action, claims 1-4 were rejected as being anticipated by Sugawara et al.(U.S. Patent No. 6,501,610, hereinafter Sugawara). With the present amendment, claim 1 has been amended to incorporate the limitations of claim 4 and claim 4 has been cancelled.

Under claim 1 an equalization target is identified for a channel by measuring a goodness metric for first and second candidate targets by reading data through the channel. The goodness metrics are compared to each other and the candidate target with the better measure is selected. The selected target is then modified to improve the measure of the goodness metric.

Sugawara does not show or suggest the invention of claim 1 as amended. In particular, Sugawara does not show or suggest selecting an initial target from two targets and then modifying the target to improve a measure of a goodness metric.

In the Office Action, it was asserted that Sugawara showed this limitation in Column 5, lines 25-31. Applicants respectfully dispute this assertion.

In the cited section, Sugawara is discussing the operation of its Viterbi detector. Such detectors include an Add-Compare-Select (ACS) circuit. The purpose of these circuits is to determine which of two paths into each state of a Viterbi trellis is the most likely path into the state. For example, on page 366 of Sridharan et al. ("A 110 MHz 350mW 0.6 CMOS 16-State Generalized-Target Viterbi Detector for Disk Drive Read Channels"), the ACS is said to select between two paths as shown in FIG. 1 of that paper. Note that in Sridharan, there is only one target. Thus, the ACS compares scores for two paths when a single target is used and selects the path with the smaller metric.

Thus, the ACS in Sugawara is not comparing metrics from two different targets. Instead, it is comparing paths set for a single target. This is made clear from the Sugawara paper referenced at column 5, lines 12-16 of Sugawara, which is submitted herewith. In the paper, Sugawara states that the targets are selected "according to recording density". This is consistent with the Sugawara patent, where Sugawara uses one target for parts of the disc with low recording densities and another target for parts of the disc with high recording densities. Thus, the Viterbi detector in Sugawara is not comparing metrics of different targets to select the target. Instead, the targets are selected based on recording densities.

Once a target is selected, the model waveforms for the selected target are provided to assumption calculator 91, which generates an expected value or assumption "a" for each possible sequence of waveform trains that can be formed from the model waveforms. The ACS uses these expected values to generate the branch metric for each path. The branch metrics of two paths are then compared to select a single path. Thus, a path, not a target, is selected through this process.

Since Sugawara is not selecting a target using the ACS, the cited section does not show or suggest modifying a target to improve the measure of a goodness metric.

Further, Sugawara never mentions modifying a selected target to improve a measure of a goodness metric. Under Sugawara, once a target is selected for a recording density, it is not modified.

This is substantially different from the present invention where after an initial target has been selected, it is further improved by modifying the target based on the goodness metric. Thus, the present invention begins with candidate targets and selects the best of these candidates, then proceeds to modify the selected target to improve the measure of the

goodness metric. The initial selection allows the process to quickly get close to the best target and the later modifications allow the process to reach the best target. Sugawara makes no mention of such a two-stage process because Sugawara never suggests modifying candidate targets.

Since Sugawara does not select a target based on the branch metrics and since Sugawara never mentions modifying a selected target to improve a measure of a goodness metric, it does not show or suggest the invention of claim 1 or claims 2 and 3, which depend therefrom.

Claims 5, and 7-10

Claims 5 and 7-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugawara in view of Sawaguchi et al. (U.S. Patent No. 5,539,588, hereinafter Sawaguchi).

Claims 5 and 7-10 are patentable over the combination of Sugawara and Sawaguchi because neither reference shows or suggests selecting one of two candidate targets and then modifying the candidate target to improve a measure of a goodness metric. As discussed above for claim 1, Sugawara does not show such a limitation. Similarly, Sawaguchi does not show this limitation.

In addition, claim 7 is further patentable over Sugawara and Sawaguchi. Under claim 7, the candidate target, which is constrained to have a spectral null, is modified so that it no longer has the spectral null. Neither Sugawara nor Sawaguchi show this limitation.

In the Office Action, it was asserted that Sawaguchi shows this limitation at column 3, lines 34-52. However, the cited section makes no mention of modifying an equalization target and specifically does not show modifying an equalization target that has a spectral null to form an equalization target that does not have the spectral null. As such, claim 7 is further patentable over the cited art.

Claims 8, 9 and 10 are also further patentable over the cited references. Under claim 8, the equalization target is modified by sequentially adjusting single terms in the target. Under claim 9, the equalization target is modified by increasing all of the terms in the target at the same time. Under claim 10, the equalization target is modified by sequentially changing pairs of terms. The combination of Sugawara and Sawaguchi does not show or suggest any of the techniques for modifying the equalization target.

In the Office Action, column 9, lines 10-25 of Sugawara were cited as showing these modifications to the equalization target. However, the cited section does not show any of these techniques for modifying an equalization target. Instead, the cited section discusses the adaptation of a filter to meet the requirements set by an equalization target. Although the cited section discusses changing filter coefficients, it does not show or suggest that an equalization target can or should be changed by sequentially changing single terms, or by changing all terms at the same time, or by sequentially changing pairs of terms. As such, the combination of Sugawara and Sawaguchi does not show or suggest the invention of claims 8, 9 and 10.

Claims 11 and 12

Claims 11 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugawara in view of Sridharan.

The combination of Sugawara and Sridharan does not show or suggest the invention of claims 11 or 12. In particular, neither reference counts the number of times an equalization target was identified for a head or a head/zone pair and then selects the equalization target that was identified for the most heads or head/zone pairs.

In the Office Action, it was asserted that Sridharan shows this limitation on page 367, column 1. However, the cited section does not mention counting the number of times

equalization targets were identified. Instead, the cited section discusses determining equalization target values for each head, where a target value is the read signal that is generated by the head given a target. Thus, each head has the same target, however, due to fluctuations in the performance of the head, the read signals will differ from head to head. Thus, the cited section does not involve determining equalization targets for a head but instead involve determining expected read signal values given a target. Further, the cited section makes no mention of counting the number of times a target is identified or selecting a target that is identified for the most heads or head/zone pairs. As such, claims 11 and 12 are patentable over Sugawara and Sridharan.

Claims 15-18

Claims 15-18 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugawara in view of Sawaguchi.

Under claim 15, an equalization target is formed by searching through a plurality of candidate equalization targets that satisfy a spectral null constraint to locate an initial equalization target that provides a best goodness measure. The initial equalization target is then adjusted so that it no longer satisfies the spectral null constraint.

The combination of Sugawara and Sawaguchi does not show or suggest the invention of claim 15. In particular, the combination does not show adjusting an initial equalization target that satisfies a spectral null so that it no longer satisfies the spectral null.

In the Office Action, it was asserted that column 3, lines 34-52 of Sawaguchi shows this adjustment step. However, the cited section does not mention adjusting an equalization target. Instead, it suggests adding intersymbol interference to a channel so that the channel response matches a desired target. It does not mention adjusting an initial equalization target

that satisfies a spectral null constraint so that it no longer satisfies the spectral null constraint. There is simply no statement in Sawaguchi that it is adjusting a target so that it does not satisfy a spectral null constraint.

Since neither Sugawara nor Sawaguchi adjust a target that satisfies a spectral null constraint so that it does not satisfy the spectral null constraint, the combination of these references does not show or suggest the invention of claims 15-18.

Claims 20 and 21

Claims 20 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugawara in view of Sawaguchi and further in view of Sridharan.

Under claims 20 and 21, a separate equalization target is formed for each head or each head/zone pair. A count of the number of times each equalization target is formed is made. The target that is formed for the most heads or head/zone pairs is selected as the equalization target for the channel.

The combination of cited references does not show or suggest the invention of claims 20 and 21. In particular, none of the references show a step of counting the number of times each equalization target is formed. As such, claims 20 and 21 are patentable over the cited combination.

Claims 22 and 25

Claims 22-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugawara in view of Sawaguchi.

As amended, claim 22 provides a method for selecting an equalization target. Under the method, a spectral null constraint is selected. An initial equalization target is then selected from a plurality of targets that satisfy the spectral null constraint. The initial equalization target is then adjusted so that it no longer satisfies the spectral null constraint.

As noted above, neither Sugawara nor Sawaguchi show or suggest adjusting an equalization target that satisfies a spectral null constraint so that it no long satisfies the spectral null constraint. As such, claim 22 and claim 25 are patentable over the cited combination.

Conclusion

In light of the above remarks, claims 1-3, 5, 7-22 and 25 are patentable over the cited art. Reconsideration and allowance of the claims is respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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